

What is claimed is:

1. A motion detection apparatus for detecting a motion in an image frame inputted and stored in a time series, comprising:
  - 5 frame division means for dividing the inputted X-th image frame  $F(X)$  into a plurality of blocks  $B(X)_{ij}$ , where  $i = 1$  to  $m$  and  $j=1$  to  $n$ ;
  - block luminance acquisition means for acquiring representative luminance values  $BL_{rep}(X)_{ij}$  of said blocks
  - 10  $B(X)_{ij}$ ;
  - frame luminance acquisition means for acquiring a representative luminance value  $FL_{rep}(X)$  of said inputted frame  $F(X)$ ;
  - storing means for storing  $BL(X)_{ij}$  and  $FL_{rep}(X)$ ;
  - 15 block luminance difference calculation means for calculating block luminance differences  $\Delta BL_{rep}(X)_{ij}$  between corresponding blocks in  $F(X)$  and a frame prior to  $F(X)$ ;
  - frame luminance difference calculation means for calculating a frame luminance difference  $\Delta FL_{rep}(X)$  between  $F(X)$  and a frame prior to  $F(X)$ ;
  - 20 absolute difference calculation means for calculating absolute values  $| \Delta BL_{rep}(X)_{ij} - \Delta FL_{rep}(X) |$ ;
  - determination means for determining that a certain block includes a motion, if said absolute value for said certain block is greater than a prescribed threshold; and
  - 25 output means for outputting the determination result.
2. The motion detection apparatus according to claim

1, wherein said determination means determines that:

- said certain block includes a motion, if said absolute value for said certain block is greater than a second threshold and moreover if either/both of said  
5    representative block luminance values of the corresponding certain blocks in  $F(X)$  and a frame prior to  $F(X)$  is/are greater than a first threshold, where said first threshold is greater than said second threshold; or
- said certain block includes a motion, if said absolute  
10   value for said certain block is greater than a third threshold and moreover if both of said representative luminance values of the corresponding certain blocks in  $F(X)$  and a frame prior to  $F(X)$  are smaller than or equal to a first threshold, where said second threshold is greater than  
15   said third threshold.

3. The motion detection apparatus according to claim 1, wherein said representative luminance value is an average, mode or median of luminance values.

4. The motion detection apparatus according to claim  
20 1, wherein said frame prior to said present frame  $F(X)$  is a frame  $F(X - 1)$  just prior to  $F(X)$  or a frame  $F(X - k)$  which is "k" frames prior to  $F(X)$ , where "k" is greater than or equal to two.

5. A motion detection computer program for detecting  
25 a motion in image frame inputted and stored in a time series, comprising the steps of:

    a frame division step for dividing the inputted X-th image frame  $F(X)$  into a plurality of blocks  $B(X)ij$ , where i

= 1 to m and j=1 to n;

a block luminance acquisition step for acquiring representative luminance values  $BL_{rep}(X)_{ij}$  of said blocks  $B(X)_{ij}$ ;

5 a frame luminance acquisition step for acquiring a representative frame luminance value  $FL_{rep}(X)$  of said inputted frame  $F(X)$ ;

a storing step for storing  $BL(X)_{ij}$  and  $FL_{rep}(X)$ ;

10 calculating block luminance differences  $\Delta BL_{rep}(X)_{ij}$  between corresponding blocks in  $F(X)$  and a frame prior to  $F(X)$ ;

15 a frame luminance difference calculation step for calculating a frame luminance difference  $\Delta FL_{rep}(X)$  between  $F(X)$  and a frame prior to  $F(X)$ ;

an absolute difference calculation step for calculating absolute values  $| \Delta BL_{rep}(X)_{ij} - \Delta FL_{rep}(X) |$  ;

20 a determination step for determining that a certain block includes a motion, if said absolute value for said certain block is greater than a prescribed threshold; and

an output step for outputting the determination result.

6. The motion detection computer program according to claim 5, wherein said determination step determines that:

25 said certain block includes a motion, if said absolute value for said certain block is greater than a second threshold and moreover if either/both of said representative block luminance values of the corresponding

certain blocks in  $F(X)$  and a frame prior to  $F(X)$  is/are greater than a first threshold, where said first threshold is greater than said second threshold; or

5       said certain block includes a motion, if said absolute value for said certain block is greater than a third threshold and moreover if both of said representative luminance values of the corresponding certain blocks in  $F(X)$  and a frame prior to  $F(X)$  are smaller than or equal to a first threshold, where said second threshold is greater than  
10      said third threshold.

7. The motion detection computer program according to claim 5, wherein said representative luminance value is an average, mode or median of luminance values.

8. The motion detection computer program according  
15      to claim 5, wherein said frame prior to said present frame  $F(X)$  is a frame  $F(X - 1)$  just prior to  $F(X)$  or a frame  $F(X - k)$  which is "k" frames prior to  $F(X)$ , where "k" is greater than or equal to two.